FAC(A) Concepts Trainer

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Forward Air Control (Airborne)

"The FAC(A) is a specifically trained and qualified aviation officer who exercises control from the air of aircraft engaged in CAS of ground troops. The FAC(A) is normally an airborne extension of the TACP."

- Marine Aviation Weapons and Tactics Squadron One (January 2004). Forward Air Controller (Airborne) Handbook.

Marines of a forward air control unit, Korea, 1951

What is the problem?

EWTG developed FAC(A) syllabus?

Four sorties

- Day indirect fire
- Day fixed wing
- Night fixed wing
- Day/night everything

Op tempo

Qualification	Initial Event Qualification Requirements All qualifications require a letter signed by the commanding officer to be placed in the NATOPS and APR. Re-qualification: A pilot shall fly all associated qualification "R" coded events. Modification to this standard is at the discretion of the commanding officer.
INSTRUMENT (RQRD-600)	IAW OPNAV 3710.7 and an annual qualification letter signed by the commanding officer.
NATOPS (RQRD-601)	IAW OPNAV 3710.7 and an annual qualification letter signed by the commanding officer.
FAM (RQRD-602)	Semi-annual EP simulator.
TERF (QUAL-610)	210, 211
NSQ HLL (QUAL-611)	211, 231, 244, 245, 251, 262
NSQ LLL (QUAL-612)	310, 311, 312, 313, 314, 315
CQ (QUAL-615)	200, 201, 202, 330
NVG CQ (QUAL-616)	331
UNAIDED CQ (QUAL-617)	430
RW DACM (QUAL-618)	410, 411, 412, 413
FW DACM (QUAL-619)	414, 416
FAC(A) (QUAL-624)	340, 341, 342, 343

Our vision

- To significantly enhance a student's understanding of the interaction between fire support assets prior to flying a training mission

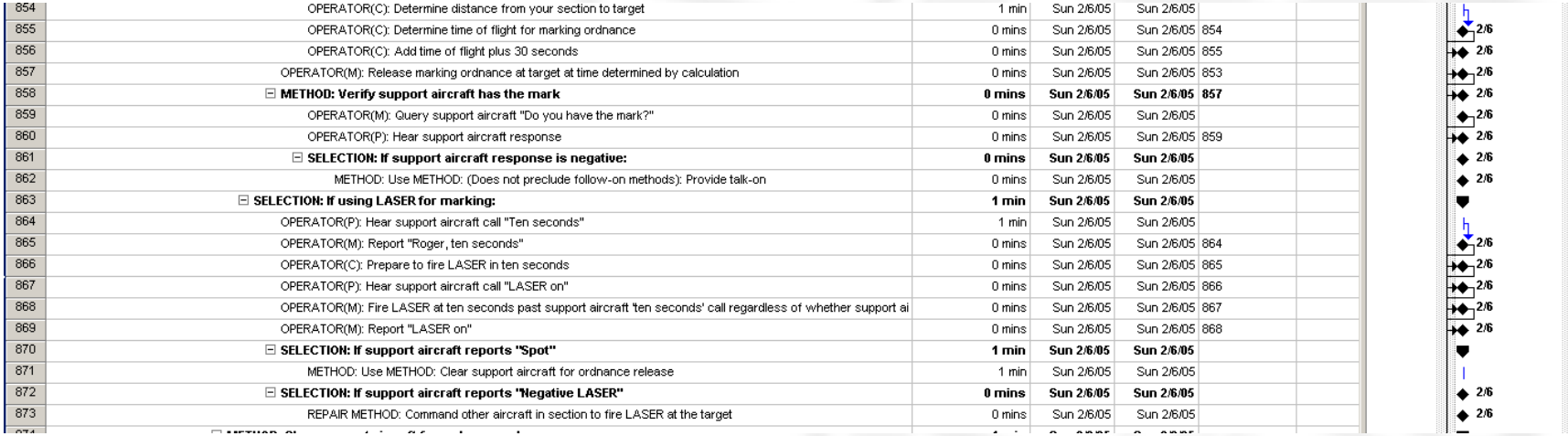
- Provide a sandbox for experimentation
  - Not a replacement for current T&R syllabus events

Our Process

- Describe the mission: map the task; select the critical ones
- Compare existing systems; plan our own if none train to critical tasks
- Determine if technology is actually the answer; match goals to tech
- Allow for an evolving requirements document
- Ensure daily contact between coders and SMEs
- Get validation (proof of concept)

Analysis of the FAC(A) Task

- Dissection of a mission to discrete decision points
- Targeting of critical skills (GOMS approach)
- Modeling of cognitive flow for later finite state machine design



854	OPERATOR(C): Determine distance from your section to target	1 min	Sun 2/6/05	Sun 2/6/05		
855	OPERATOR(C): Determine time of flight for marking ordnance	0 mins	Sun 2/6/05	Sun 2/6/05	854	
856	OPERATOR(C): Add time of flight plus 30 seconds	0 mins	Sun 2/6/05	Sun 2/6/05	855	
857	OPERATOR(M): Release marking ordnance at target at time determined by calculation	0 mins	Sun 2/6/05	Sun 2/6/05	853	
858	**METHOD: Verify support aircraft has the mark**	**0 mins**	**Sun 2/6/05**	**Sun 2/6/05**	**857**	
859	OPERATOR(M): Query support aircraft "Do you have the mark?"	0 mins	Sun 2/6/05	Sun 2/6/05		
860	OPERATOR(P): Hear support aircraft response	0 mins	Sun 2/6/05	Sun 2/6/05	859	
861	**SELECTION: If support aircraft response is negative:**	**0 mins**	**Sun 2/6/05**	**Sun 2/6/05**		
862	METHOD: Use METHOD: (Does not preclude follow-on methods): Provide talk-on	0 mins	Sun 2/6/05	Sun 2/6/05		
863	**SELECTION: If using LASER for marking:**	**1 min**	**Sun 2/6/05**	**Sun 2/6/05**		
864	OPERATOR(P): Hear support aircraft call "Ten seconds"	1 min	Sun 2/6/05	Sun 2/6/05		
865	OPERATOR(M): Report "Roger, ten seconds"	0 mins	Sun 2/6/05	Sun 2/6/05	864	
866	OPERATOR(C): Prepare to fire LASER in ten seconds	0 mins	Sun 2/6/05	Sun 2/6/05	865	
867	OPERATOR(P): Hear support aircraft call "LASER on"	0 mins	Sun 2/6/05	Sun 2/6/05	866	
868	OPERATOR(M): Fire LASER at ten seconds past support aircraft 'ten seconds' call regardless of whether support ai	0 mins	Sun 2/6/05	Sun 2/6/05	867	
869	OPERATOR(M): Report "LASER on"	0 mins	Sun 2/6/05	Sun 2/6/05	868	
870	**SELECTION: If support aircraft reports "Spot"**	**1 min**	**Sun 2/6/05**	**Sun 2/6/05**		
871	METHOD: Use METHOD: Clear support aircraft for ordnance release	1 min	Sun 2/6/05	Sun 2/6/05		
872	**SELECTION: If support aircraft reports "Negative LASER"**	**0 mins**	**Sun 2/6/05**	**Sun 2/6/05**		
873	REPAIR METHOD: Command other aircraft in section to fire LASER at the target	0 mins	Sun 2/6/05	Sun 2/6/05		

Mapping the task

What skills are deemed critical to create proficiency?

- Knowing where things are (comprehension of battle space geometry)
- Knowing what to say, to whom, and when (effective communications)
- Puzzle-solving (setting up attack packages)

What skills are not necessary to exercise in a concepts trainer?

- Gathering of planning tools
- Aircraft control
- Navigation
- 'Switchology'

Challenges: match goals to

TRANFER ITEMS	CRITICAL TRANSFER ITEM	CURRENT TECHNOLOGY FACILITATES	HOW FACILITATED (TECHNOLOGY)
12.2.3.2 METHOD: Conduct attack			
12.2.3.2.1 METHOD: Aurally acquire support aircraft			
12.2.3.2.1.1 OPERATOR(P): Hear IP inbound call ((callsign) (IP name) inbound)			
12.2.3.2.1.2 OPERATOR(P): Scan target area			
12.2.3.2.1.3 OPERATOR(C): Choose prominent terrain near target likely to be visible from support aircraft viewpoint	X	YES	Delta3D engine terrain resolution sufficient for airborne view discrimination
12.2.3.2.2 METHOD: Visually acquire support aircraft			
12.2.3.2.2.1 OPERATOR(P): See Initial Point on map	X	YES	2D map displays common
12.2.3.2.2.2 OPERATOR(P): See your location on map	X	YES	Icon representation on 2D 'overhead view' map
12.2.3.2.2.3 OPERATOR(C): Determine azimuth from which support aircraft is likely to appear	X**	YES	Moving 'blip' representation of support aircraft on 2D 'overhead view' map
12.2.3.2.2.4 METHOD (Does not preclude continuation of follow-on methods): Visually scan appropriate azimuth for support aircraft			
12.2.3.2.2.5 SELECTION: If support aircraft is in visual range:			
12.2.3.2.2.5.1 OPERATOR(M): Report Visual			
12.2.3.2.2.5.2 METHOD (Does not preclude follow-on methods): Provide talk-on			
12.2.3.2.2.5.2.1 METHOD: Use visual 'funnel' for support aircraft talk-on			
12.2.3.2.2.5.2.1.1 OPERATOR (M): Query if support aircraft sees largest feature in target area (Do you see the ridgeline running north-south?)	X	NOT WELL	Voice recognition not sufficiently advanced; potential use with limited vocabularies
12.2.3.2.2.6 SELECTION: If support aircraft is not in visual range:			
12.2.3.2.6.1 OPERATOR(M): Report Continue			
12.2.3.2.6.2 METHOD: Use METHOD: Visually scan appropriate azimuth for support aircraft			

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Iterative Development

- Evolving requirements document
  - Overall concept was clear; minutiae of functionality was not
  - Ambitious in scope
  - Interface design under constant revision
  - User interface experiments
- Trainee evaluation
  - Game metrics or instructor-based?
  - Supportability
- Evolving (shrinking) task-training list
  - Do a few things, and do them well

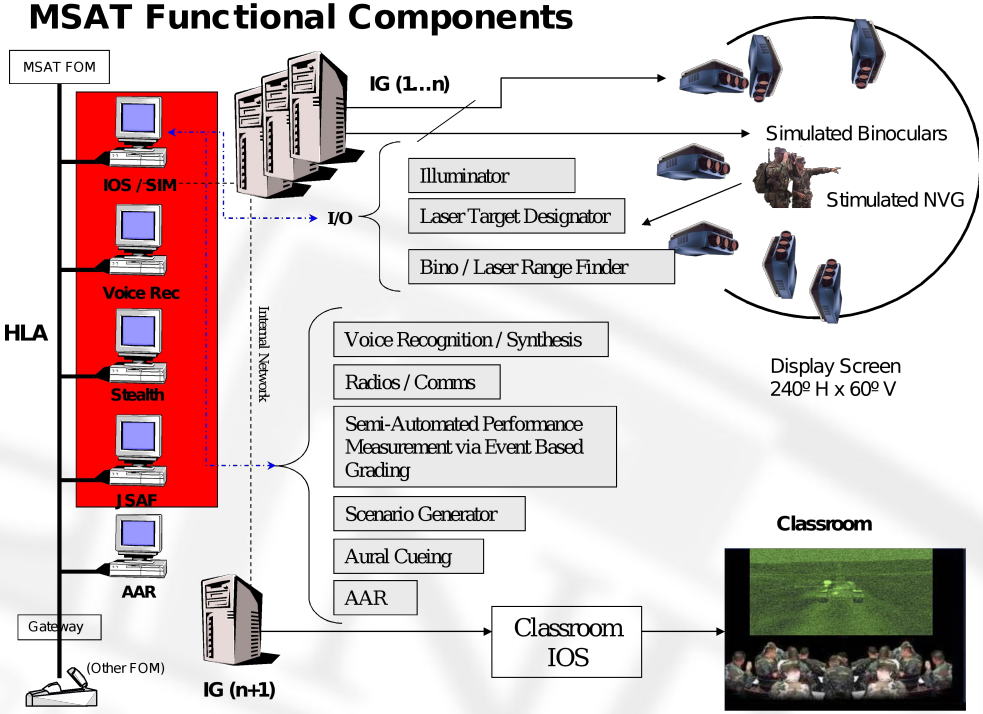
Validation Proposal

DURATION	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
0800 45 minutes	Squadron 1 Presentation	Squadron 1 FAC(A) pilots use Cleared Hot (Familiarization)	Squadron 1 FAC(A) pilots use Cleared Hot (Second use)	Squadron 1 FAC(A) pilots use Cleared Hot (Third use)	Squadron 1 **Written Test** (Follow Up)
0845 45 minutes	Squadron 1 **Inventory Test**	Squadron 1 FAC(A) pilots use Cleared Hot (First Use)	Squadron 1 WTI / pilot debriefs (Second use)	Squadron 1 WTI / pilot debriefs (Third use)	
0930 45 minutes		Squadron 1 WTI / pilot debriefs (First use)			Squadron 2 **Written Test** (Follow Up)
1100 45 minutes	Squadron 2 Presentation	Squadron 2 FAC(A) pilots use Cleared Hot (Familiarization)	Squadron 2 FAC(A) pilots use Cleared Hot (Second use)	Squadron 2 FAC(A) pilots use Cleared Hot (Third use)	
1145 45 minutes	Squadron 2 **Inventory Test**	Squadron 2 FAC(A) pilots use Cleared Hot (First use)	Squadron 2 WTI / pilot debriefs (Second use)	Squadron 2 WTI / pilot debriefs (Third use)	Squadron 3 **Written Test** (Follow Up)
1230 45 minutes		Squadron 2 WTI / pilot debriefs (First use)			
1400 45 minutes	Squadron 3 Presentation	Squadron 3 FAC(A) pilots use Cleared Hot (Familiarization)	Squadron 3 FAC(A) pilots use Cleared Hot (Second use)	Squadron 3 FAC(A) pilots use Cleared Hot (Third use)	
1445 45 minutes	Squadron 3 **Inventory Test**	Squadron 3 FAC(A) pilots use Cleared Hot (First use)	Squadron 3 WTI / pilot debrief (Second use)	Squadron 3 WTI / pilot debrief (Third use)	
1530 45 minutes		Squadron 3 WTI / pilot debrief (First use)			

Existing systems comparison

Call for Fire Trainer (CFFT)

MSAT Functional Components



+ MAWTS-1 buy-in already established

- Instructor requirement

+ Planned incorporation into EWTG ground school training

- Large footprint

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Existing systems comparison (cont)

Indirect Fire Forward Air Control Trainer (I-FACT)

+ Versatile and complete training solution

- Procurement cost

Forward Observer Personal Computer Simulator (FOPCSIM)

+ Open source

+ Small footprint

- FO task is only a subset of the overall FAC(A) task. Consequently, additional functionality necessary.

Proof of Concept

MAWTS-1 validation of Cleared Hot v1.0.4

- ADT&E Department Head and RWOAS specialist
- Experienced FAC(A) instructor

+ “Simple is better” for the novice FAC(A)
+ Stand-alone capability
+ Overall… “not far off the mark”

CLEARED HOT!

SCENARIO

Ambush at the Palms

OVERVIEW

The countries of Chipotle and Wasabi have a long history of animosity towards each other.
In 2001, citing the brutality of the regime and its growing WMD program, the United States went to war with the country of Wasabi, defeating its forces within three months, and

OPTIONS

EXIT

READY ROOM

CLEARED HOT!

Situation | Mission | Execution | Admin/Logistics | Command/Signals

General

The countries of Chipotle and Wasabi are strategically located in Southwestern Asia amid large oil reserves. These states have a long history of animosity towards each other fueled by ethnic and religious hatred. From 1986 to 1992 they fought a long and bloody war with neither side making any significant advances. In 1992 they agreed to a UN-brokered cease-fire but this did little to stop the animosity between the two countries. While large scale military operations stopped, small conflicts continued to erupt along the border of the two countries. After the war ended both sides made a tremendous push to re-build their military with Wasabi launching an ambitious WMD development program.

Throughout the 1990's the United States came to regard the country of Wasabi as an imminent threat to international peace and security. In 2001, citing the brutality of the regime and its growing WMD program, the United States went to war with the country of Wasabi. US forces managed to defeat the Wasabian military within three months and placed the country under an

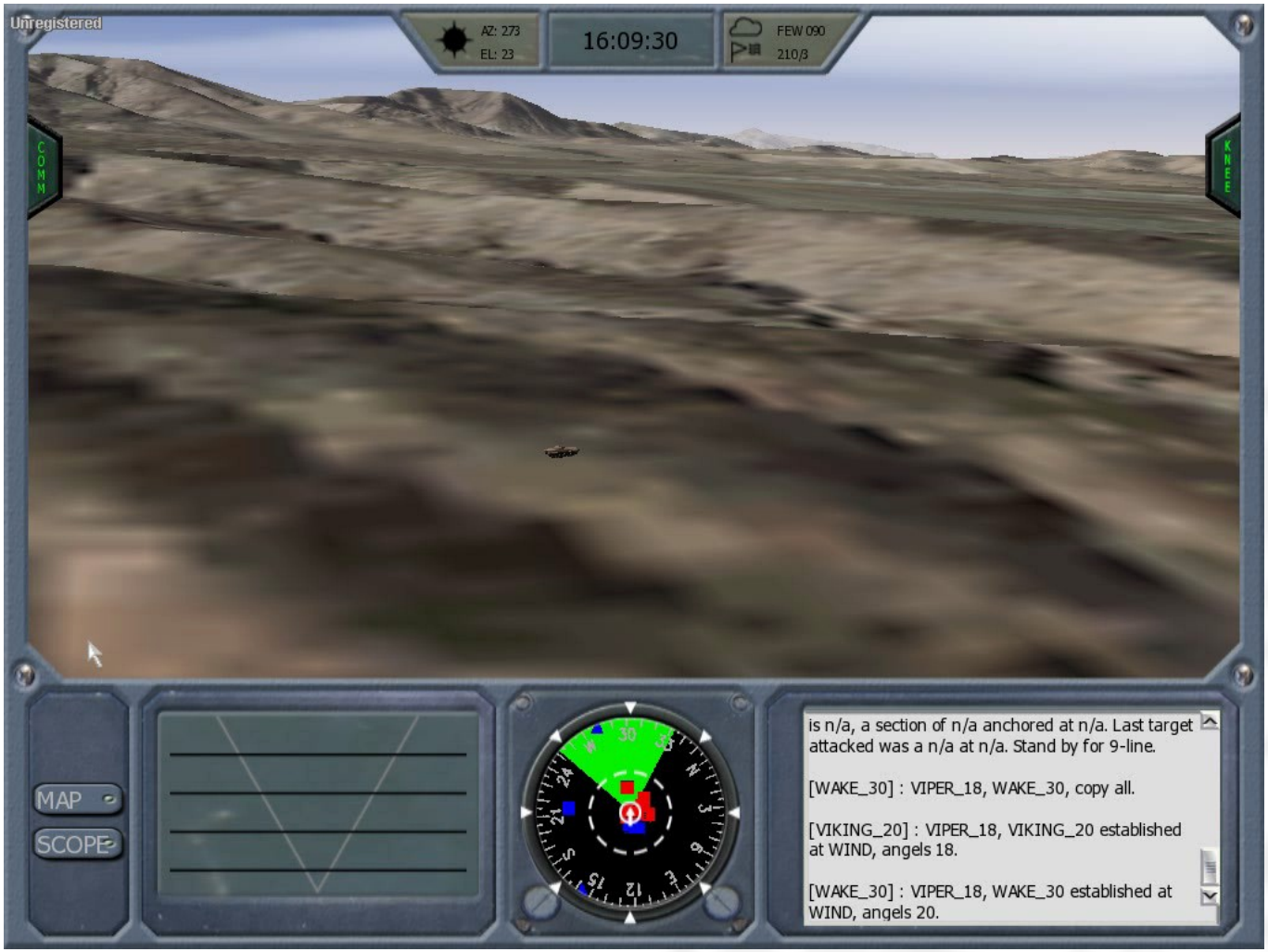
BACK LOAD


AZ: 273
EL: 23
16:00:50
FEW 090
Check In
Terminal Control
BHO
RTB
Check In and Request Situation Update
MONGO
VIKING_20
WAKE_30
BAT_10
CLEAR
XMIT
COMM
KNEE
9 Line
CFF
ATO
BDA
BHO
Notes
None 0
IP
None
HEADING (deg)
0
DISTANCE
0
convert
(m)
(nm)
ELEVATION (m)
0
DESCRIPTION
no target
OPEN
DUG IN
LOCATION
MARK
No ammo
FRIENDLIES
NONE
0
distance (m)
EGRESS
None
TOT (hhmm)
SEAD
None
FINAL ATTACK CONE
(+/-15 degs of)
0
RESTRICTIONS
NONE
Delete
Clear
New
MAP
SCOPE
[VIKING_20] : MONGO, VIKING_20 is mission number 3004, up as fragged at FROG, angels 18, playtime 0+29.
[MONGO] : VIKING_20, MONGO, roger. Copy up as fragged. Stack at FROG angels 18 and stand by. VIPER_18 will be assuming terminal control shortly.


AZ: 273
EL: 23
16:10:48
FEW 090
210/3
MiniMap
BLACK
MOUNTAINS
CANYON
SPIDER
SENSITIVE
AREA
TRACK
N UP
HOVER
COMM
KNEE
MAP
SCOPE
number 3004, up as fragged at FROG, angels 18, playtime 0+22.
[WAKE_30] : VIPER_18, WAKE_30 is mission number 3006, up as fragged at FROG, angels 20, playtime 0+22.
[BAT_10] : VIPER_18, BAT_10 is mission number 3008, up as fragged at FROG, angels 22, playtime 0+22.


AZ: 273
EL: 23
16:14:52
FEW 090
210/3
ZOOM
TRACK
SLAVE
LASER
RNG: 755m
POS: 11SNU 74101 23998
Affiliation
Classificatio
Notes
CLASSIFY
MAP
SCOPE
number 3004, up as fragged at FROG, angels 18, playtime 0+22.
[WAKE_30] : VIPER_18, WAKE_30 is mission number 3006, up as fragged at FROG, angels 20, playtime 0+22.
[BAT_10] : VIPER_18, BAT_10 is mission number 3008, up as fragged at FROG, angels 22, playtime 0+22.

Demo


Unregistered
AZ: 273
EL: 23
16:09:30
FEW 090
210/3
COMM
KNEE
MAP
SCOPE
is n/a, a section of n/a anchored at n/a. Last target attacked was a n/a at n/a. Stand by for 9-line.
[WAKE_30] : VIPER_18, WAKE_30, copy all.
[VIKING_20] : VIPER_18, VIKING_20 established at WIND, angels 18.
[WAKE_30] : VIPER_18, WAKE_30 established at WIND, angels 20.

Future work

After-Action Review (AAR)

Type-1 CAS

Talk-on

Air Officer Approval of Attack Plan

Audio

Tiered system

Mission Editor

Timeline Tool – Visual Display of Attack Packages

Geometry Tool – Toggling of 3D FSCMs

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Questions

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